

FOUR NEW SPECIES OF DOBSONFLIES FROM CALIFORNIA

(Megaloptera: Corydalidae)

HARRY P. CHANDLER

California Department of Fish and Game, Red Bluff, California

Two of the species were suspected of being new when they were first collected in 1946 along with another new species which is being described elsewhere by a student who has worked out its life history. The other two species described here were discovered while working over the California Insect Survey and California Academy of Sciences collections during the preparation of the section on California Megaloptera for a book on the aquatic insects of California to be published by the University of California. There are still several undescribed species or subspecies in the west, but the author prefers not to describe them at this time because the picture of their speciation and distribution is not clear at present. Since the Nearctic species of this group were last keyed by Davis in 1903, the number of described species has doubled; and from the species included in *Chauliodes* have been separated four other genera. Van der Weele's world revision in 1910 threw considerable light on the generic picture but completely confused the species by placing in synonymy about half of the valid Nearctic species. In view of this, the author plans to revise the Nearctic Corydalidae in the near future.

***Dysmicohermes ingens* Chandler, new species**

Holotype male: Alar expanse 122 mm.; body predominantly testaceous brown, sparsely covered with conspicuous long, silky hair. *Head* rufous, coarsely and closely punctate, except for smooth raised area on vertex; labrum transverse elliptical; clypeus smooth but otherwise poorly differentiated from front, apex straight, angled at sides and nearly straight to margin of eye. Antennae with 52 segments, filiform, relatively short, length about three times width of head, each segment a little longer than wide, covered with short microscopic pile, and sprinkled with short, depressed spines about $\frac{1}{4}$ as long as segment. Ocelli parallel with outer margin of antennae, middle ocellus less convex, $\frac{4}{5}$ as wide as lateral ocelli, ocelli separated from antennae by about own width, middle ocellus separated from lateral ocelli by width of latter, lateral ocelli more widely separated from each other; cheeks of head parallel a little distance behind prominent eyes; mandibles mostly concealed when closed. *Pronotum* with sides nearly parallel, slightly convergent anteriorly, faintly alutaceous with fine punctures, covered with a short sparse pubescence. *Wings* (fig. 5), slightly translucent, stigma more so; veins brownish, not conspicuously variegated; fore wing with translucent brown spots, with slight tendency to be arranged along the veins, spots quite small except near the basal $\frac{1}{5}$ and $\frac{2}{5}$ of the wing where they form two

indistinct transverse bands. Hind wings more faintly spotted basally and posteriorly, none behind the cubitus. Radial sector with seven branches reaching margin, media two-branched in fore wing and four-branched in hind wing; cubitus three-branched. Fore wing with base of 1st anal conspicuously raised and covered by most pronounced black spot on wing; anterior branch of 2nd anal vein connected to the first anal by a cross vein which forms end of 1st anal cell, posterior branch of 2nd anal vein forming end of 2nd anal cell. *Genitalia* (figs. 3, 4), cerci with a deep cleft between the upper and lower lobes, reaching more than half way to base or nearly to convex pitted area on the lateral dorsal side near the base, anterior margin on ventral lateral side with deep emargination partially filled by base of an elongate osmeterium-like eversible membranous tube which may be withdrawn into the body, length of tube is about 2.5 times the width of the genital capsule, tube tapering to a point.

Allotype female: Alar expanse 160 mm.; very similar to male but larger. *Genitalia*; valves of ovipositor with convex pitted area near base, upper lobe short, lower lobe $2\frac{1}{2}$ times as long, narrowed to middle.

Holotype, MIAMI RANGER STATION, MARIPOSA COUNTY, CALIFORNIA, 27 July 1946, elev. 5,000 feet (H. P. Chandler). *Allotype*, same data as holotype. Six *paratypes* are from the same locality and collected by H. P. Chandler in 1946 except as noted; ♂, 29 June, ♂, 6 July; 2 ♂♂, 21 July; ♂, 23 July; ♀, 29 July 1946 (T. O. Thatcher). One ♀ *paratype* from Sequoia Nat. Park, California and one ♀ from San Bernardino County, 1916, "Viggo Tarp." *Holotype* and *allotype* in the California Academy of Sciences collection. *Paratypes* in the California Insect Survey collection, Los Angeles County Museum, Museum of Comparative Zoology and the author's collection.

This species is closely related to *D. disjunctus* (Walker). The shape and venation of the wings are almost identical, but the coloration is different. In *D. disjunctus* the spots are larger, more intense and the membrane more hyaline, the head is less strongly punctured and more rugose, the ocelli a little smaller and the transverse depression behind the eyes less pronounced, the four, medial, basal, raised areas on the vertex are separated by a medial and transverse groove of even width so as to form a nearly perfect cross. The *genitalia* as figured by Munroe (1953), while very similar in type is different in almost every detail.

With the possible exception of *Acanthacorydalis* which is found in the Orient, *D. ingens* has a larger wing spread than any other species in the order Megaloptera.

All except two specimens of *D. ingens* listed above were taken

in the summer of 1946 when the University of California entomology field class used the U. S. Forest Service insect laboratory at Miami Ranger Station just five miles south of Yosemite National Park. Most of the specimens were taken around a light trap that was operated part of the time. They were rarely taken in the trap or seen fluttering about it but were found at rest on some object near by. Apparently they came from a small stream that passed the camp on its way down the side of the canyon. Dr. Struble, one of the laboratory staff, on his way to work one morning, found a cast pupal skin about 20 feet from the stream. Knowing my interest in the adults, he located, about 6 inches away in the bank, the hole from which it had emerged. No larvae were ever taken.

Dysmicohermes crepusculus Chandler, new species

Holotype male; alar expanse 84 mm.; body color dark brown to pale, long hair very sparse and inconspicuous. *Head* dark brown to rufous with mouthparts and adjacent areas pale, except for black tip of mandibles; dorsal surface of head from clypeus to behind ocelli wrinkled and with microsculpture of short parallel ridges, from the eyes posteriorly microsculpture is more rugose with close set short, depressed hairs; smooth areas of vertex faintly alutaceous, scarcely raised or even slightly depressed. Labrum narrowly transverse, anterior margin straight with small emargination at middle, front marginated anteriorly with pale color, clypeus very narrow, depressed and smooth. Antennae about 3 times as long as width of head, fuscous brown, 35 segments, filiform tapering to end except basal segment which is nearly twice as wide as next few segments, segments about 3 times as long as wide, sprinkled with short distally inclined spines $1/3$ width of segment, micropile scarcely detectable on the basal segments. Outer margin of ocelli parallel with inner margin of antennae, ocelli separated from each other by width of lateral ocelli which are a little smaller, separated from antennae by 1.3 times width of median ocellus, diagonal ridge separating depressed area around ocelli from eyes. Mandibles mostly concealed when closed. *Pronotum* with sides slightly concave, a little wider anteriorly, color brown with anterior pale collar tapering to point at each side, microsculpture alutaceous, tending to short parallel ridges posteriorly and laterally; devoid of long pubescence, only a few short hairs near anterior and posterior margin. *Wings* (fig. 6), translucent; veins pale, not conspicuously variegated, both wings except anal area of hind wing spotted with moderate to small fuscous spots with slight tendency to form one or two transverse bands. Base of first anal of anterior wing moderately raised without entire raised area black. Costal area of fore wing widest at basal $1/4$ where it is wider than other cells of wing. Radial sector with seven branches reaching margin, R_3 forked beyond its middle; media two-branched in fore wing and three-branched in hind wing, cubitus with three branches reaching margin. Anterior branch of second anal vein connected to first anal vein by cross vein

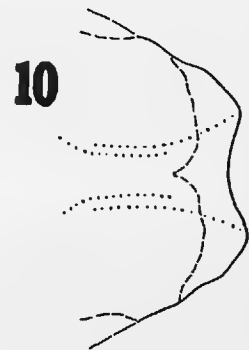
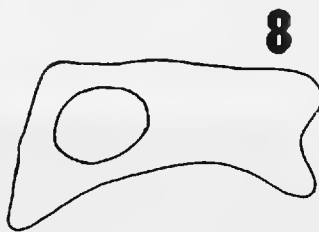
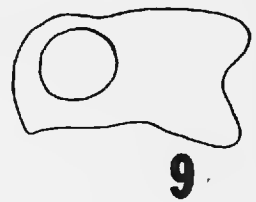
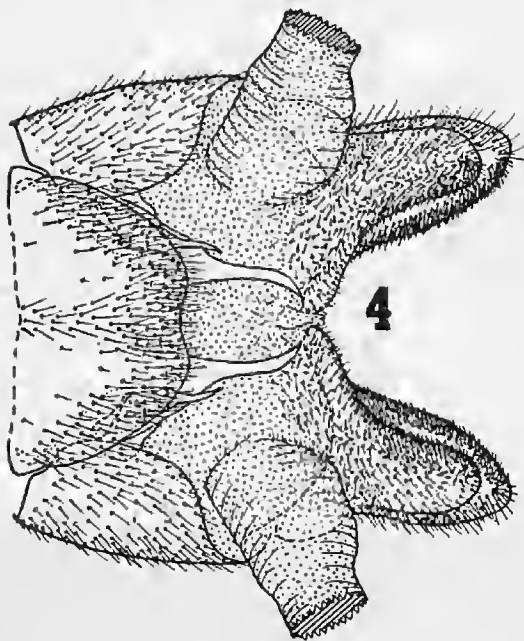
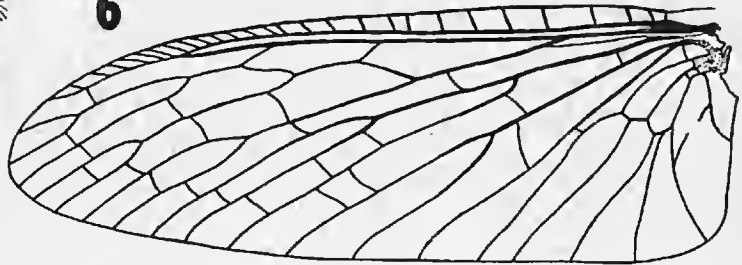
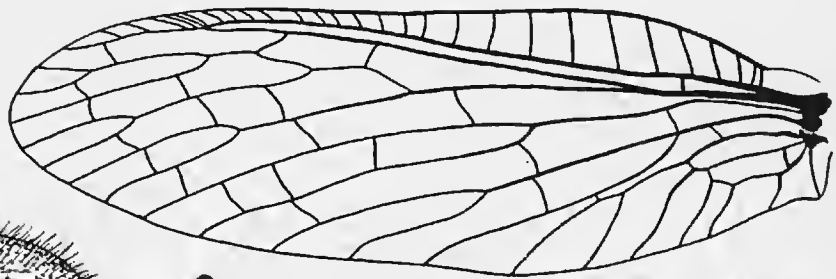
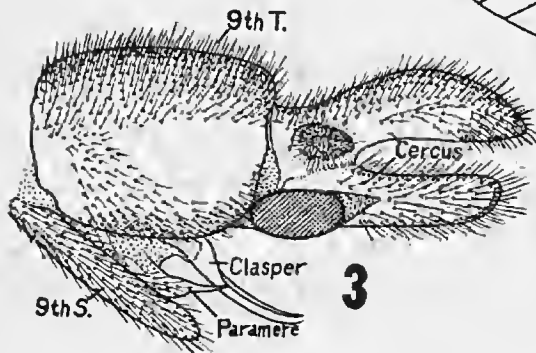
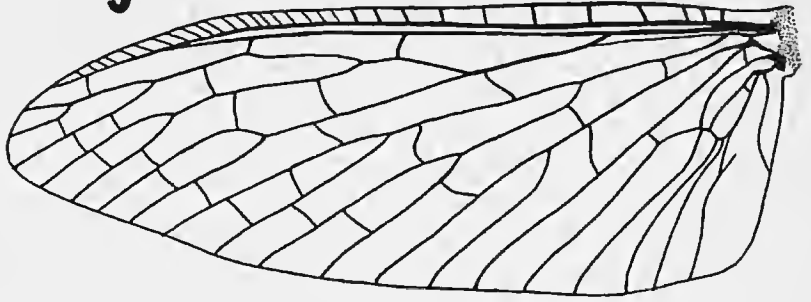
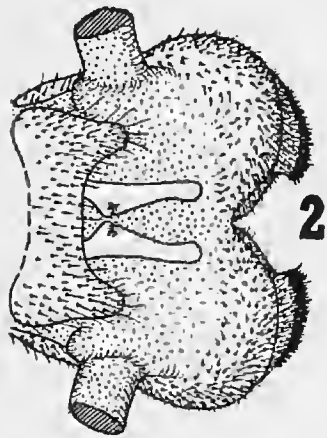
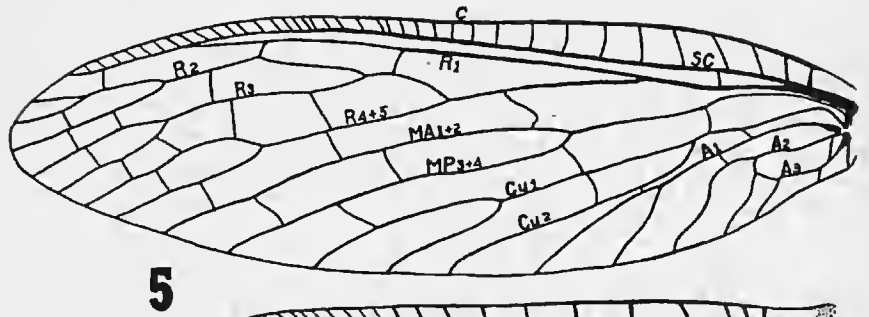
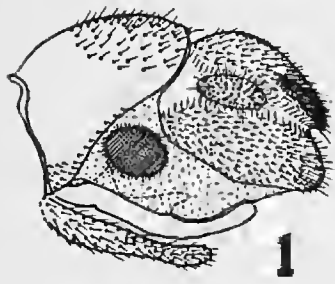
only, which forms end of first anal cell, posterior branch of second anal vein forming end of second anal cell. Genitalia (figs. 1, 2): cerci very short, upper and lower lobes represented by slight protuberances separated by a horizontal groove around end of cerci, ending near base of convex punctate area, eversible parallel-sided membranous tube three times as long as width of genital capsule, located on each side anterior to and below cerci.

Allotype female: alar expanse 106 mm.; generally similar to male except that sculpture and proportions of head are slightly different; white collar of pronotum less distinct; genital valves with upper and lower lobes barely projecting beyond convex pitted area which occupies most of side.

Holotype, PYRAMID RANGER STATION, ELDERADO COUNTY, CALIFORNIA, 20 Aug. 1952 (J. W. MacSwain); *allotype*, 2 mi. S.W. Miami Ranger Station (Girl Scout Camp, N. Fk. Fresno River), Mariposa County, California, 25 July 1946, elev. 5,000 feet (H. P. Chandler). Twenty-seven paratypes from California and one from Oregon as follows: *Mono Co.*: ♀, Convict Cr. Experimental Sta., 12 Aug. 1953, elev. 7,200 (I. La Rivers); *Mariposa Co.*: ♀, 2 mi. SW. Miami R. S., July 1946 ♂ & ♀, Girl Scout Camp, N. Fk. Fresno River, July 1953, elev. 5,000 (Girl Scouts); ♀, Nevada Falls, 29 July 1946, elev. 5,950 feet (H. P. Chandler); ♀, Yosemite, Aug. 1935 (E. S. Ross); *Nevada Co.*: ♂, Grass Valley, July 1942 (L. Bwd.); *Sierra Co.*: ♂, Goodyear Creek, 10 July 1921 (E. H. Nast); *Plumas Co.*: ♂, 4 mi. W. Quincy, 26 June 1949 (J. W. MacSwain); *Butte Co.*: ♂, Chico, 23 July 1951 (Beriman); *Shasta Co.*: ♂, Burney Creek Hatchery, 15 July 1947 (D. W. Adams); *Siskiyou Co.*: ♂, Dunsmuir, 30 June 1934 (G. H. & J. L. Sperry); 3 ♂♂ S. Fk. Sacramento River, 6 Aug. 1953 (H. P. Chandler); *Colusa Co.*: 11 ♂♂, 3 ♀♀, Paradise Creek, 23 July 1953, elev. 2,400 (H. P. Chandler); *Lake Co.*: ♂, Anderson Springs, 12 July 1953 (W. R. Bauer); and one ♂ collected by Behrens, who died in 1898, labeled "Francisco." Oregon, *Marion Co.*: ♂, Breitenbush Hot Springs, 5 July 1934, elev. 2,222 feet (H. A. Scullen). The holotype and allotype will be placed in the California Academy of Science collection; paratypes in the Cali-

EXPLANATION OF FIGURES

Fig. 1. *Dysmicohermes crepusculus*, lateral view of male genitalia. Fig. 2. Ventral view of the same. Fig. 3. *D. ingens*, lateral view of male genitalia. Fig. 4. Ventral view of the same. Fig. 5. Wings of *D. ingens*. Fig. 6. Wings of *D. crepusculus*. Fig. 7. *Protochauliodes simplus*, ventral view of tip of aedeagus. Fig. 8. *P. simplus*, lateral view of cerci. Fig. 9. *P. montivagus*, lateral view of cerci. Fig. 10. *P. montivagus*, ventral view of tip of aedeagus.



fornia Insect Survey collection, Illinois Natural History Survey collection, Chico State Teachers College collection, Museum of Comparative Zoology and the author's collection.

This species is provisionally placed in *Dysmichohermes* but is not closely related to either *D. disjunctus* or *D. ingens*. From these two species it is most easily separated by its smaller size, the wide costal area of the fore wing, the hind wing with three branches of the media reaching the margin, and the genitalia. There is some variation in the specimens studied but it is difficult to describe. The number of segments in the antennae range from 35 to 47, seeming to be a little more numerous but shorter in the female. The antennae of the males were usually about 2.9 times as long as the width of the head, while those of the female were only about 2.2 times. The alar expanse in the males ranged from 67 mm. to 98 mm. while that of the females ranged from 100 to 108 mm. Other variations were noted, especially in the proportions and sculpturing of the head. The latter seemed a little more pronounced in the female.

Protochauliodes simplus Chandler, new species

Holotype male: Alar expanse 78 mm.; general body color fuscous with lighter markings, body with little hair except ventrally. *Head* fuscous brown, pale in front of antennae. Labrum with sides rounded, slightly emarginate medially. Antennae brown, $4\frac{1}{2}$ times longer than width of basal segments. Ocelli large, median slightly smaller but as wide as front between antennae, only about $\frac{1}{3}$ its width from antennae, lateral ocelli separated from eyes and median ocelli by own width, vertex behind ocelli not depressed but evenly rounded from side to side, smooth areas alutaceous, not conspicuously raised or darker, rest of vertex very finely rugose. *Wings* slightly translucent with many small, smoky spots with a tendency to be arranged along sides of veins and a few larger opaque spots along the anterior margin; fore wing with a larger spot covering the first medio cubital cross vein; hind wings with spots restricted to apical portion. R_{4+5} unbranched, R_2 and R_3 forked at apical third, R_3 without cross vein between its two branches; anterior branch of second anal vein stalking with first anal for a short distance, so that latter appears three branched. *Genitalia*: cerci (fig. 8), somewhat dorso-ventrally flattened basally; aedeagus (fig. 7), nearly flat.

Holotype, TANBARK FLAT, SAN DIMAS EXPERIMENTAL FOREST, LOS ANGELES COUNTY, CALIFORNIA, 13 July 1950 (J. D. Paschke). Ten *paratypes*, all males, were collected from the same locality by A. T. MaClay (6), S. Miyagawa (2), E. G. Linsley (1) and D. E. Barcus (1) on July 7 (1), 12 (1), 17 (1), 18 (1), 22 (2), 23 (4), 1952. The holotypes will be placed in the California Academy

of Sciences collection with paratypes in the California Insect Survey collection, University of California collection at Davis, Los Angeles County Museum and the author's collection.

This species is related to *P. infuscatus* and *P. minimus*. The wing venation and body form of the species in this group are remarkably constant and sometimes the difference between species is less than individual variation within the species. Except that *infuscatus* is black and *minimus* is usually smaller, the only sure way of separating the species is by examining the genitalia.

***Protochauliodes montivagus* Chandler, new species**

Holotype male: alar expanse 72 mm.; description similar to that of *P. simplus* except as noted. Lateral ocelli more than own width from eyes; smooth areas raised a little, rest of vertex with microsculpture of short parallel ridges. Wings with opaque spots more restricted, outer half of hind wing faintly potted. *Genitalia*: cerci (fig. 8), short and stubby, as wide at apex as at base as viewed from side; aedeagus (fig. 10), flat, only the tip chitinized ventrally.

Holotype from ST. CHARLES HILL, SIERRA COUNTY, CALIFORNIA, 7 July 1921 (E. H. Nast collector). Three *paratypes*, all males, from Sierra City, Sierra Co., Calif., 25 July 1952 (Don Richter); Quincy, 4 mi. W., Plumas Co., Calif., 2 July 1949 (R. L. Langston); and Lake Vernon, Yosemite, Calif., 25 July 1937 (E. Herald). The holotype will be placed in the California Academy of Sciences collection. Paratypes will be placed in the University of California collection at Davis, Los Angeles County Museum and the author's collection.

LITERATURE CITED

DAVIS, K. C.

1903. Sialidae of North and South America. New York State Museum Bull. 68: 442-486, pls. 51, 52.

MUNROE, E. G.

1951. The identity and generic position of *Chauliodes disjunctus* Walker (Megaloptera: Corydalidae), Canadian Ent., 83(2): 33-35, 3 text figs.

MUNROE, E. G.

1953. *Chauliodes disjunctus* Walker: a correction, with the description of a new species and a new genus (Megaloptera: Corydalidae). Canadian Ent., 85(5): 190-192, 4 text figs.

WEELE, H. W. VAN DER

1910. Megaloptera, Catalogue systématique et descriptif. Coll. Zool. Selys Longchamps, Brussels. Fasc. 5: 1-93, 70 text figs., 4 pls.